

September 17, 1982

TECHNICAL EVALUATION REPORT
ST. LUCIE UNIT 1
SEISMIC QUALIFICATION OF AUXILIARY FEEDWATER SYSTEM

1. INTRODUCTION

Since the accident at Three Mile Island, considerable attention has been focused on the capability of nuclear power plants to reliably remove decay heat. The NRC has recently undertaken Multiplant Action Plan C-14 "Seismic Qualification of AFW Systems" [Ref. 1], which is the subject of this evaluation.

To implement the first phase of Action Plan C-14, the NRC issued Generic Letter No. 81-14 "Seismic Qualification of AFW Systems" [Ref. 2], dated February 10, 1981, to all operating PWR licensees. This letter requested each licensee (1) to conduct a walk-down of non-seismically qualified portions of the AFW system and identify deficiencies amenable to simple actions to improve seismic resistance, and (2) to provide design information regarding the seismic capability of the AFW system to facilitate NRC backfit decisions.

The licensee of St. Lucie Unit 1 responded with a letter dated September 18, 1981 [Ref. 3]. The licensee's response was found not to be complete and a Request for Additional Information (RAI) was issued by the NRC, dated April 2, 1982 [Ref. 4]. The licensee provided a supplemental response in a letter dated May 6, 1982 [Ref. 5].

This report provides a technical evaluation of the information provided in the licensee's responses to the Generic Letter, and includes a recommendation regarding the need for additional analysis and/or upgrading modifications of this plant's AFW system.

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2. EVALUATION

Information provided in licensee's responses included:

- o Specification of the overall seismic capability of the AFW system.
- o Identification of currently non-seismically qualified components of the AFW system.
- o Discussion of the levels of seismic capability of the non-seismically qualified AFW system components.
- o Description of the AFW system boundary.
- o Status of compliance with seismic related NRC Bulletins and Information Notices.
- o Results of walk-down of non-seismically qualified portions of the AFW system.
- o Additionally, description of methodologies and acceptance criteria for the seismically qualified components.
- o Additionally, results of walk-down performed for the anchorages/supports for all Class 1E electrical equipment.

We have reviewed the licensee's responses, and a point-by-point evaluation of licensee's responses against Generic Letter's requirements is provided below.

(1) Seismic Capability of AFW System

Except for those items identified in the following, the AFW system has been designed, constructed and maintained to withstand an SSE utilizing methods and acceptance criteria consistent with that applicable to other safety-related systems in the plant. Presently, those items identified by the licensee as not being fully seismically qualified are evaluated below:

- o Pumps/Motors - None
- o Piping - None



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- o Valves/Actuators - None
- o Power Supplies - None
- o Water Source(s) - None
- o Initiation/Control Systems - (a) Local gauges are not seismically qualified but the licensee stated that they are not essential for safety system operation. (b) The control grade automatic initiation circuitry, installed as a post-TMI modification, is not seismically qualified but the licensee stated that it would be upgraded to safety grade and seismic Category I during their outage in September 1981. We conclude that the initiation/control systems possesses an SSE level of seismic capability upon completion of the upgrade of the control grade automatic initiation circuitry.
- o Structures - The conduit supports and mounting of certain electrical boxes were not qualified by rigorous analysis. However, the licensee inspected the above items in the field. They indicated in their response letter that this inspection verified that, in general, the support systems have conservative support spans and were installed in accordance with National Electrical Code Standards using standard commercially available strut material, clamps, U-bolts, and various steel shapes, in conjunction with ANSI C80.1 rigid steel conduit. This level of design for miscellaneous electrical component supports is consistent with industry practices for plants of the St. Lucie Unit 1 era. The licensee also stated that these support designs and materials are used universally throughout the nuclear and fossil power plant field as well as other industries and were considered to have adequate seismic resistance at the time of installation. Also, the licensee indicated that industry tests on cable tray/conduit support assemblies based on worst case models indicated that systems supported by commercial grade components similar to those used at St. Lucie Unit 1 remained functional after being subjected to tests which simulated earthquake conditions. In their best judgment, the licensee believed that the system would remain functional after an SSE. In conclusion, we judge that the conduit supports and mounting of certain electrical boxes possess an SSE level of seismic capacity.

Based on our evaluation, those areas of the AFW system judged not to possess an SSE level capability are identified below:

- o Pumps/Motors None
- o Piping None
- o Valves/Actuators None
- o Power Supplies None
- o Water Sources(s) None
- o Initiation/Control Systems None
- o Structures None

In summary, our evaluation indicated that the AFW system at St. Lucie Unit 1 possesses an overall level of seismic capability that can withstand an SSE.

Because the primary water source and supply path is seismically qualified, switchover to a secondary water source is not involved. Information regarding the seismic capability of any alternate decay heat removal system is not required because the AFW system will have an SSE level of seismic capability upon the completion of the ongoing upgrade of the initiation/control systems.

Regarding the AFW system boundary, licensee indicated that there is no branch piping in the flowpath which is required to be isolated in order to perform the AFW system function. There are no other branch piping connections to the AFW system. Only normal small bore vents, drains and instrument taps all with root valves, are provided as an integral part of the AFW system piping. These portions were seismically analyzed with the AFW system piping to meet seismic Category I requirements. Therefore, we conclude that the AFW system boundary fully conforms to that required by the Generic Letter.

The licensee stated that the AFW system was included within the scope of the seismic related NRC Bulletin 79-02, 79-04, 79-07, 79-14, 80-11 and IE Information Notice 80-21.

(2) Walk-Down of Non-Seismically Qualified Portions of AFW System

A field inspection was conducted covering all system components that could not be readily qualified by existing documentation. These items consisted of non-seismically qualified miscellaneous conduit and electrical box supports. The licensee indicated that the as-built support system has considerable seismic resistance, and in their best engineering judgment the licensee believed that the system would remain functional following an SSE.

(3) Additional Information

The licensee provided information on the methodologies and acceptance criteria that were used in the seismic design of the seismically qualified portions of the AFW system.

Additionally, licensee decided to extend the inspection and review of electrical equipment support/anchorage to include all major Class 1E components for the balance of safety related systems. All major electrical equipment anchorages and cable tray supports were found to be satisfactory.

3. CONCLUSIONS

The information contained in licensee's responses to GL 81-14 is complete. The licensee conducted a walk-down to cover all non-seismically qualified portions of the AFW system and did not find any deficiencies. In addition, we conclude that the AFW system boundary fully conforms to the boundary definition specified in the Generic Letter.



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Based on the submitted information, we conclude that the AFW system provides a reasonable assurance to perform its required safety function following the occurrence of an SSE upon completion of the ongoing upgrade of the initiation/control systems. Therefore, we recommend that no further action be initiated regarding re-analysis and/or modification of the AFW system of this plant under NRC Multiplant Action C-14.

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REFERENCES

1. D. G. Eisenhut, U. S. Nuclear Regulatory Commission, memorandum to H. R. Denton, "Multiplant Action Plan C-14; Seismic Qualification of Auxiliary Feedwater Systems," February 20, 1981.
2. U.S. Nuclear Regulatory Commission, Generic Letter No. 81-14 to all operating pressurized water reactor licensees, "Seismic Qualification of Auxiliary Feedwater Systems," February 10, 1981.
3. R. E. Uhrig, Florida Power and Light Company, Letter to D. G. Eisenhut of U.S. Nuclear Regulatory Commission, September 18, 1981.
4. R. A. Clark, USNRC, letter to R. E. Uhrig of Florida Power and Light Company, "Request for Additional Information on Seismic Qualification of the Auxiliary Feedwater System, St. Lucie Unit 1," April 2, 1982.
5. R. E. Uhrig, Florida Power and Light Company, Letter to R. A. Clark of USNRC, May 6, 1982.

